

EHPS
Parallel gripper

FESTO
Festo SE & Co. KG
Ruiter Straße 82
73734 Esslingen
Deutschland
+49 711 347-0
www.festo.com
8154958
2021-05b
[8154960]

Translation of the original instructions
© 2021 all rights reserved to Festo SE & Co. KG

1 Applicable Documents

All available documents for the product -> www.festo.com/sp.

2 Product labelling

Warning symbols on the product
If the housing is damaged, protection against dangerous voltages is no longer guaranteed.

Tab. 1: Warning symbols on the product

3 Safety

3.1 Safety instructions

- Observe labelling on the product.
- Before working on the product: Switch off the power supply, ensure that it is off and secure it against being switched on again.
- The occurrence of a failure could lead to unforeseeable movements if the product is connected with the power supply. Only operate the product once protective measures have been taken against mechanical hazards to body parts.
- Observe tightening torques. Unless otherwise specified, the tolerance is ± 20 %.
- This product can generate high frequency malfunctions, which may make it necessary to implement interference suppression measures in residential areas.

3.2 Intended use

The intended use of the product is to grip and hold payloads (workpieces) using custom-designed gripper fingers attached by the customer.

3.3 Foreseeable misuse

When not used as intended, the product-supported protection can be impaired.

3.4 Training of qualified personnel

Work on the product may only be carried out by qualified personnel who can evaluate the work and detect dangers. The qualified personnel have skills and experience in dealing with electrical (open-loop) control technology.

4 Additional information

- Accessories -> www.festo.com/catalogue.

5 Product overview

5.1 Function

The gripper has an integrated servo motor. The gripper mechanism converts the rotary motion of the servo motor into a linear motion of the gripper jaws. The gripper jaws move towards one another (closing) or apart (opening). Gripper fingers are fastened to the gripper jaws. The payload can be gripped in 2 ways:
- on the external contour (external gripping) when closing
- on the internal contour (internal gripping) when opening
The parallel gripper is controlled by a higher-order controller using digital signals.

5.2 Structure

Fig. 1: Product design
1 Gripper jaw
2 Slot for proximity switch
3 Rotary switch for setting the speed for gripping force
4 Locating hole and thread for mounting
5 Electrical connection
6 LED Ready
7 LED Error
8 Plug screw
9 Locating hole and thread for gripper finger mounting

6 Transport and storage

- Store the product in a cool, dry environment protected from UV and corrosion. Keep storage times short.

7 Assembly

7.1 Preparing the gripper fingers

The gripper fingers are not included in the delivery.

- Requirements for the gripper fingers -> Technical data:
- Observe the max. permissible forces and max. permissible torques at the gripper jaw.
  - Observe the max. length and max. weight.
  - Use gripper fingers that are as short and light as possible.
  - Manufacture gripper fingers that are suitable for the payload and type of gripping action.

7.2 Mounting the gripper fingers

Fig. 2: Gripper finger mounting
1 Screw
2 Centring pin
3 Gripper finger

- Fig. 2: Gripper finger mounting
1. Press centring pin [2] or centring sleeve into the locating holes in the gripper jaws.
  2. Position the prepared gripper fingers [3] on the gripper jaws and secure with 2 screws [1] on each. Fix gripper jaws in place during mounting and use the specified tightening torque.

| EHPS                                      | -16       | -20       | -25       |
|-------------------------------------------|-----------|-----------|-----------|
| Screw                                     | M4        | M4        | M5        |
| Centring hole for centring sleeve [H8]    | 7         | 7         | 9         |
| Centring hole for centring pin [H8]       | 3         | 4         | 4         |
| Jaw width                                 | 10 ± 0.05 | 12 ± 0.05 | 15 ± 0.05 |
| Tightening torque (brace at gripper jaws) | 2.9       | 2.9       | 5.9       |

## 7.3 Mounting the gripper

### 7.3.1 Through-hole mounting and direct mounting

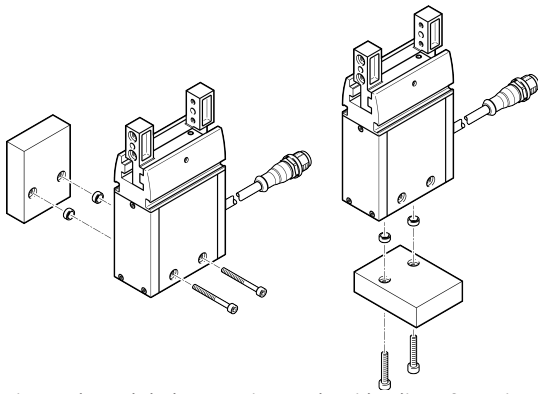


Fig. 3: Through-hole mounting on the side, direct fastening underneath

| EHPS                  |      | -16 | -20 | -25 |
|-----------------------|------|-----|-----|-----|
| Direct fastening      |      |     |     |     |
| Screw                 |      | M4  | M4  | M6  |
| Max. screw-in depth   | [mm] | 8   | 8   | 12  |
| Centring hole         | [mm] | 7   | 7   | 9   |
| Tightening torque     | [Nm] | 2.9 | 2.9 | 10  |
| Through-hole mounting |      |     |     |     |
| Screw                 |      | M3  | M3  | M4  |
| Centring hole         | [mm] | 7   | 7   | 9   |
| Tightening torque     | [Nm] | 1.2 | 1.2 | 2.9 |

Tab. 2: Mounting attachments and tightening torque

### 7.3.2 Mounting with adapter kit

Adapter kits → [www.festo.com/catalogue](http://www.festo.com/catalogue).

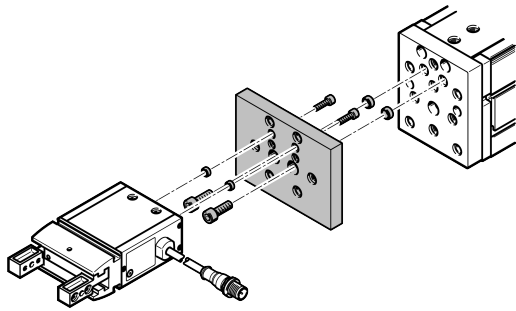


Fig. 4: Mounting with adapter kit from below

## NOTICE

### Accumulation of heat results from cramped installation situation.

Material damage or malfunction.

- Mount the product with sufficient space for heat dissipation.

- Press 2 centring sleeves into the locating holes of the gripper.
- Use the centring sleeves to position the gripper on the connecting surface.
- Select screws in accordance with the type of mounting.
- Tighten screws with the associated tightening torque.

### 7.4 Mounting proximity switches

If required: use proximity switch to sense the position of the gripper jaws in the slot. Use only proximity sensors approved for the product.

## 8 Installation

### 8.1 Electrical installation

#### ⚠ WARNING

#### Risk of injury due to electric shock

- For the electric power supply, use only PELV or SELV circuits that ensure a reliable electric disconnection from the mains network.

#### ⚠ WARNING

#### Risk of injury due to electric shock or burns.

- The gripper does not offer any additional protection against unintended high currents in the supply cables.
- The cross section of the supply cables should be designed to meet the maximum current value that could occur in the event of a failure.

#### ⚠ WARNING

#### Danger of crushing.

The gripper fingers could move unintentionally and crush body parts.

- Do not reach into the movement range.

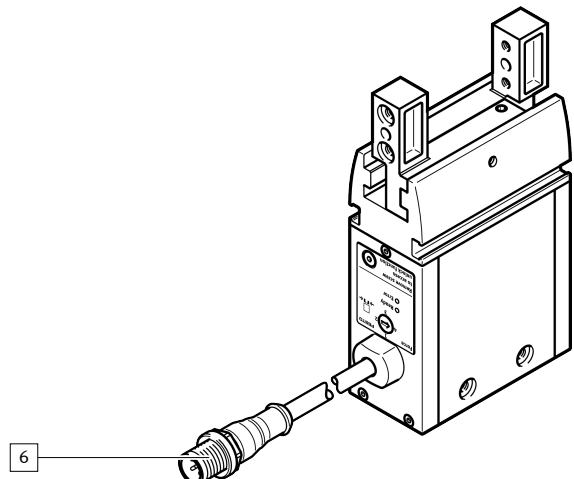


Fig. 5: Electrical connection

- Switch off power to the controller and safeguard it from being switched on again unintentionally.
- Use permissible connecting cable → [www.festo.com/catalogue](http://www.festo.com/catalogue).
- Connect the parallel gripper to the controller at the connection plug.

| M12 plug<br>(5-pin, A-coded) | Pin <sup>1)</sup> | Connection        | Identifier                |
|------------------------------|-------------------|-------------------|---------------------------|
|                              | 1 (BN) brown      | +24 V DC (± 10 %) | Nominal operating voltage |
|                              | 2 (WH) white      | Input 1           | Open gripper jaws         |
|                              | 3 (BU) blue       | 0 V               | –                         |
|                              | 4 (BK) black      | Input 2           | Close gripper jaws        |
|                              | 5 (GY) grey       | n.c.              | Not connected             |

1) Wire colour with use of connecting cables according to accessories → [www.festo.com/catalogue](http://www.festo.com/catalogue)

Tab. 3: Pin allocation

## ⚠ DANGER

### Danger of crushing due to unexpectedly moving loads and unintentional movements.

Contrary to specification IO-Link port class B without galvanic isolation between primary and secondary power supply. This can lead to malfunction or damage of the IO-Link Master and the connected IO-Link devices.

- Connect pin 3 (L-) and pin 5 (N24) externally to avoid compensating currents via the gripper.
- When installing further IO-Link devices on the master, note that the actuator supply can only be switched off via pin 2 (P24).

## 9 Commissioning

### 9.1 Preparation

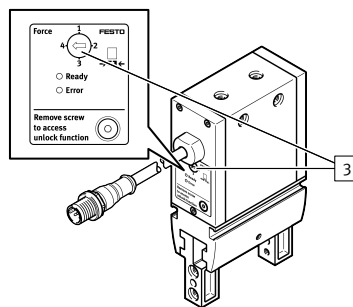


Fig. 6: Set speed for gripping force

- Set the required speed for the gripping force at the rotary switch [3]. Representation of total gripping force → 13.2 Characteristic curves.
  - Position 1 = approx. 50% of gripping force
  - Position 2 = approx. 70% of gripping force
  - Position 3 = approx. 85% of gripping force
  - Position 4 = approx. 100% of gripping force

#### i

- The speed influences the gripping force. Adjusting the gripping force is not a linear process.
- The gripping position and gripping force are not readjusted.
- The design of the gripper jaws has a major influence on the achievable gripping force.

## 9.2 Procedure

### ⚠ WARNING

#### Danger of crushing.

The gripper fingers could move unintentionally and crush body parts.

- Do not reach into the movement range.

The gripper is controlled (open/close) by commands from a higher-order controller to the digital inputs (Pin 2 and Pin 4). In this case, the gripper is edge-triggered and moves on detection of a rising edge. As soon as a high signal level is detected, travel to the stop is executed. Please ensure that, once travel is complete, the corresponding signal is reset again before transmitting a signal in the opposite direction. Pause times of at least 10 ms must be observed between cancelling the signal and the next command.

If a signal remains at the high signal level until the next travel, this can prevent unintended travel being initiated in the event of a cable break.

For certain gripping situations, it may be necessary to send an additional gripping signal (max. 3x in one direction).

#### Behaviour in emergency off

- In the event of an emergency off, the gripper jaws stop moving.
- When the gripper grips a component, the position and force achieved are maintained by the self-locking function of the jaws.
- If the gripper jaws are in motion at the time the current is switched off, the gripping process is no longer fully completed. A force cannot or can only be partially dynamically applied.

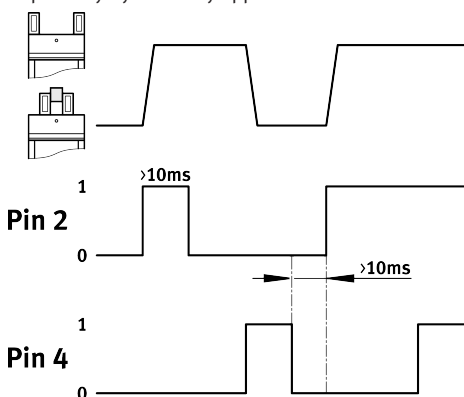


Fig. 7: Signal diagram

1. Switch on the power supply.
  - ↳ The Ready LED is green.
2. Open gripper jaws:
  - Apply a rising edge (0 → 1) at pin 2
  - Logic 0 at pin 4.Pin allocation for connection → Tab. 3 Pin allocation
3. Approach the workpiece to be gripped.
4. Closing the gripper jaws:
  - Apply a rising edge (0 → 1) at pin 4
  - Logic 0 at pin 2.
5. Execute a test run. During the test, check that the workpiece is gripped properly.

## 10 Maintenance

### 10.1 Safety

### ⚠ WARNING

#### Danger of crushing due to unexpectedly fast-moving loads and unintentional movements.

- Remove the payload.
- Switch off power to the product.
- Safeguard the power supply from being switched on again unintentionally.

### 10.2 Cleaning

Clean the product with a soft cloth. Do not use aggressive cleaning agents. For use with reduced particle emission:

- Remove abrasion and contamination from the product on the following schedule:
  - Prior to initial commissioning.
  - Regularly during operation.

### 10.3 Lubrication

| Interval                         | Maintenance work                                                                                                                                |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| After 5 million switching cycles | Grease the guide of the gripper jaws. Permissible lubricating grease → <a href="http://www.festo.com/spareparts">www.festo.com/spareparts</a> . |

Tab. 4

**i** Cut the lubrication interval by half if one of the following applies:

- High thermal stress
- Heavy contamination
- Proximity of grease-dissolving liquids or vapours

## 11 Malfunctions

### 11.1 Diagnostics

| LED | Meaning                                                                                           |
|-----|---------------------------------------------------------------------------------------------------|
|     | Ready LED is green<br>Nominal operating voltage at connection [3] pin 1 is 24 V DC ± 10%.         |
|     | Ready LED is off<br>Nominal operating voltage is switched off.                                    |
|     | Error LED is red<br>Nominal operating voltage at connection [3] Pin 1 is outside the valid range. |
|     | Error LED flashes red<br>Device error                                                             |

Tab. 5: LED

### 11.2 Fault clearance

### ⚠ WARNING

#### Danger of crushing due to unexpectedly fast-moving loads and unintentional movements.

- Remove the payload.
- Switch off power to the product.
- Safeguard the power supply from being switched on again unintentionally.

### ⚠ WARNING

#### Danger of crushing.

The gripper fingers could move unintentionally and crush body parts.

- Do not reach into the movement range.

| Fault description                       | Cause                                                           | Remedy                                                               |
|-----------------------------------------|-----------------------------------------------------------------|----------------------------------------------------------------------|
| Gripper does not hold payload securely. | Gripping point of gripper fingers is too far outwards.          | Move gripping point inwards.                                         |
|                                         | Sufficient force cannot be applied.                             | Increase travel path. Minimum travel → 13.1 Technical data, general. |
|                                         | Payload is too heavy.                                           | Select a larger gripper.                                             |
| Gripper fingers do not move uniformly.  | Slots are dirty.                                                | Clean and grease the slots.                                          |
|                                         | Gripper jaws are distorted.                                     | Rectify distortion.                                                  |
| Gripper fingers do not open/close.      | Jamming due to excessive speed of the gripper fingers.          | Resolve jamming → Procedure instructions.                            |
|                                         | Interruption of communication between gripper and control unit. | Check connecting cable.                                              |
|                                         | Gripper is faulty.                                              | Replace gripper.                                                     |
|                                         | Squeaking noises                                                | Lubricate gripper → 10.3 Lubrication.                                |
| Squeaking noises                        | Lack of lubrication                                             | Lubricate gripper → 10.3 Lubrication.                                |
|                                         | Payload is too great.                                           | Observe permissible values → 13.1 Technical data, general.           |

Tab. 6: Fault clearance

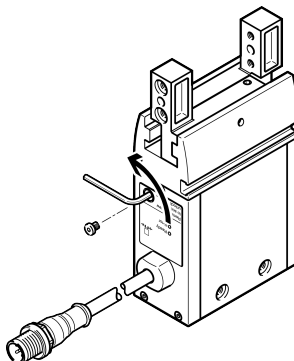


Fig. 8: Resolve jamming of gripper jaws

1. Remove the plug screw.
2. Rotate the worm shaft underneath using the hex wrench until the jamming is resolved:
  - Anti-clockwise (external gripping)
  - Clockwise (internal gripping)
3. Retighten plug screw.

| EHPS                                  | -16   | -20   | -25 |
|---------------------------------------|-------|-------|-----|
| Hex wrench                            | ≈ 1.5 | ≈ 1.5 | ≈ 2 |
| Tightening torque for plug screw [Nm] | 0.6   | 0.6   | 2.8 |

11.3 Repair

Send product to the Festo repair service for repair.

12 Disassembly

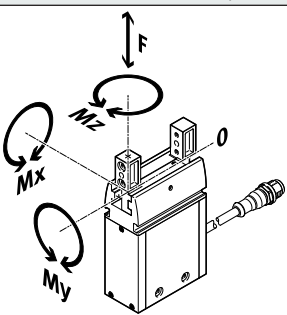
⚠ WARNING

Danger of crushing due to unexpectedly fast-moving loads and unintentional movements.

- Remove the payload.
- Switch off power to the product.
- Safeguard the power supply from being switched on again unintentionally.

13 Technical data

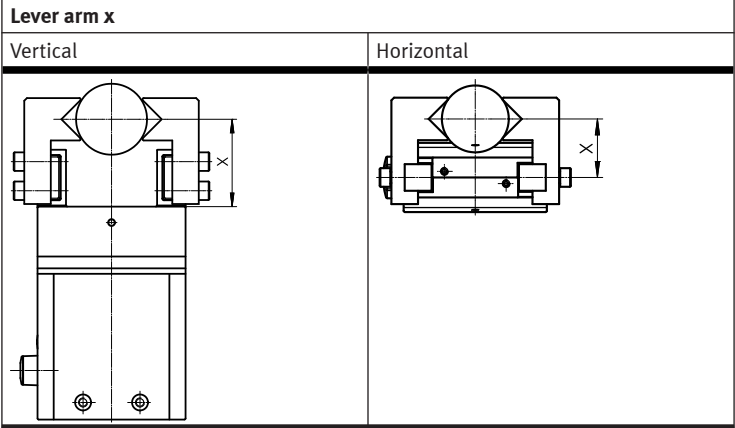
13.1 Technical data, general

| EHPS                                                                               |          | -16                                                  | -20  | -25  |
|------------------------------------------------------------------------------------|----------|------------------------------------------------------|------|------|
| Design                                                                             |          | Electric parallel gripper                            |      |      |
| Mounting position                                                                  |          | Any                                                  |      |      |
| Minimum travel per jaw for max. gripping force                                     | [mm]     | 0.5                                                  |      |      |
| Mass moment of inertia                                                             | [kg/cm²] | 0.78                                                 | 2.02 | 5.24 |
| Max. load per gripper finger                                                       | [g]      | 100                                                  | 150  | 230  |
| Max. permissible length of gripper finger                                          | [mm]     | 80                                                   | 100  | 120  |
| Max. repetition accuracy                                                           | [mm]     | 0.03                                                 | 0.01 | 0.01 |
| Max. interchangeability                                                            | [mm]     | 0.02                                                 |      |      |
| Nominal operating voltage DC                                                       | [V DC]   | 24 ± 10 %                                            |      |      |
| Max. current consumption                                                           | [A]      | 1                                                    | 2    |      |
| Switching level                                                                    | [V]      | +18 ... +28 (logic 1)<br>-3 ... +8 (logic 0)         |      |      |
| Max. cable length                                                                  | [m]      | 30 (including gripper cable)                         |      |      |
| Degree of protection                                                               |          | IP40                                                 |      |      |
| Relative humidity                                                                  | [%]      | 0 ... 95 (at 25 °C non-condensing)                   |      |      |
| Ambient temperature <sup>1)</sup>                                                  | [°C]     | +5 ... +60                                           |      |      |
| Storage temperature                                                                | [°C]     | -20 ... +60                                          |      |      |
| CE marking (declaration of conformity)                                             |          | In accordance with EU EMC Directive <sup>2) 3)</sup> |      |      |
| Electrical safety                                                                  |          | In accordance with standard EN 61010-1:2010          |      |      |
| Weight                                                                             | [g]      | 296                                                  | 532  | 904  |
| Materials                                                                          |          |                                                      |      |      |
| Housing                                                                            |          | Aluminium                                            |      |      |
| Covering                                                                           |          | Plastic                                              |      |      |
| Gripper jaws, bearings, plugs, screws                                              |          | Steel                                                |      |      |
| O-ring                                                                             |          | NBR                                                  |      |      |
| Max. force (static) and max. torque (static)                                       |          |                                                      |      |      |
|  |          |                                                      |      |      |
| F <sub>z</sub>                                                                     | [N]      | 200                                                  | 325  | 450  |
| M <sub>x</sub>                                                                     | [Nm]     | 7                                                    | 13   | 28   |
| M <sub>y</sub>                                                                     | [Nm]     | 4.4                                                  | 8    | 16   |
| M <sub>z</sub>                                                                     | [Nm]     | 7                                                    | 13   | 28   |

1) Max. housing temperature = ambient temperature +35 K  
2) Only when using connecting cable from Festo  
3) Max. length of the connecting cable (including gripper cable): 30 m

Tab. 7: Technical data

13.2 Characteristic curves



Tab. 8: Alignment of lever arm x

**i**  
The forces refer exclusively to centric gripping of non-elastic components.

**Total gripping force F<sub>H</sub> (2x jaw gripping force) as a function of lever arm x and rotary switch position → 9.1 Preparation**

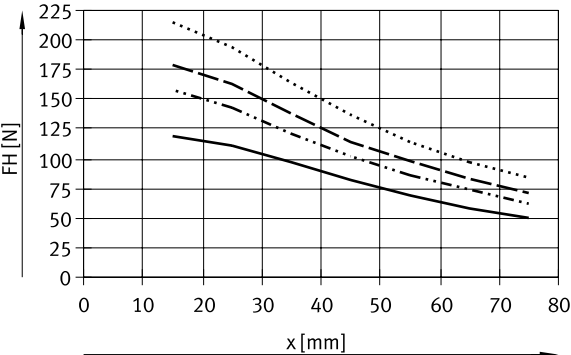


Fig. 9: EHPS-16 external gripping, lever arm vertical

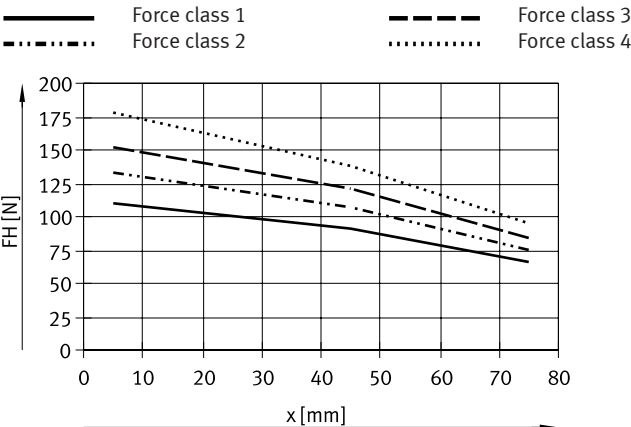


Fig. 10: EHPS-16 internal gripping, lever arm vertical

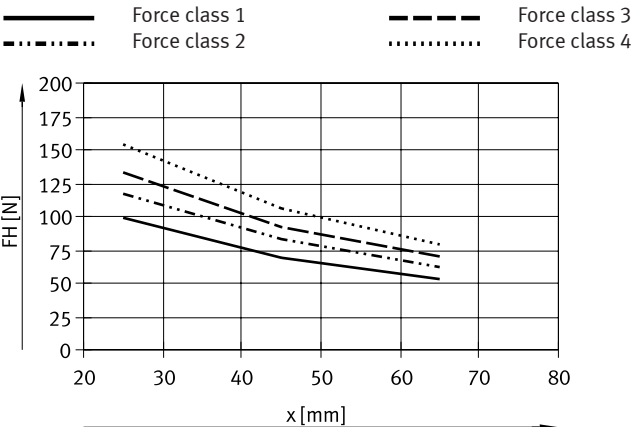


Fig. 11: EHPS-16 external gripping, lever arm horizontal

Force class 1      Force class 3  
Force class 2      Force class 4

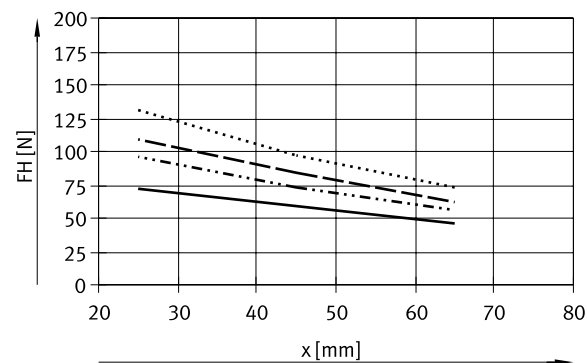


Fig. 12: EHPS-16 internal gripping, lever arm horizontal

Force class 1 (Solid line)  
Force class 2 (Dotted line)  
Force class 3 (Dashed line)  
Force class 4 (Dotted line)

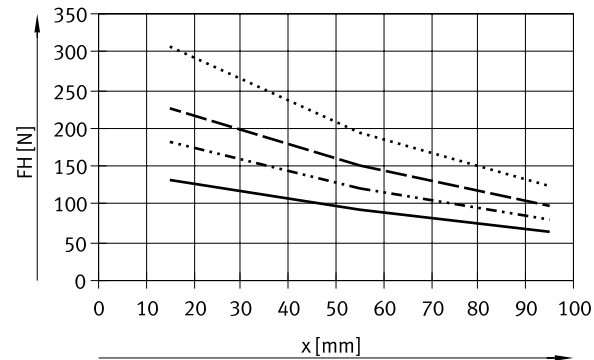


Fig. 13: EHPS-20 external gripping, lever arm vertical

Force class 1 (Solid line)  
Force class 2 (Dotted line)  
Force class 3 (Dashed line)  
Force class 4 (Dotted line)

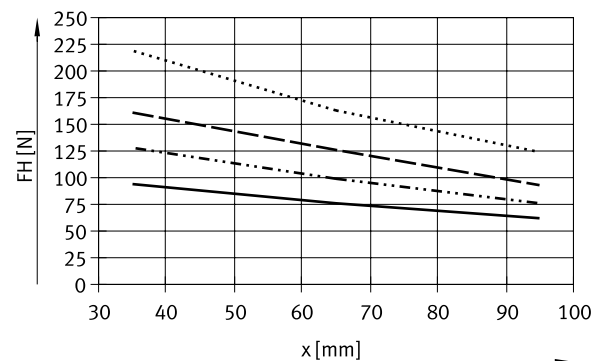


Fig. 14: EHPS-20 internal gripping, lever arm vertical

Force class 1 (Solid line)  
Force class 2 (Dotted line)  
Force class 3 (Dashed line)  
Force class 4 (Dotted line)

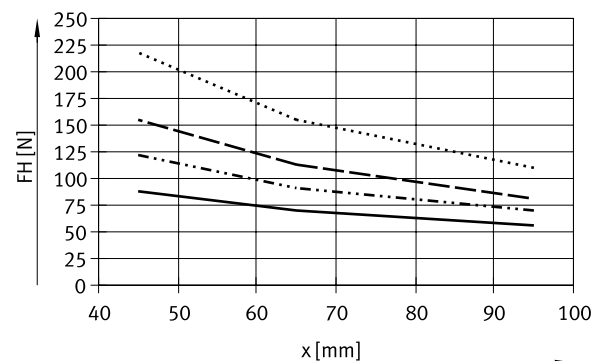


Fig. 15: EHPS-20 external gripping, lever arm horizontal

Force class 1 (Solid line)  
Force class 2 (Dotted line)  
Force class 3 (Dashed line)  
Force class 4 (Dotted line)

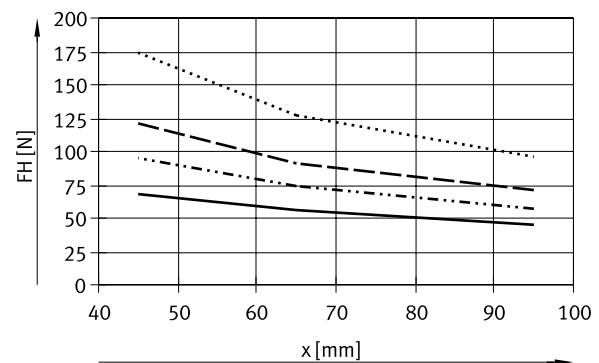


Fig. 16: EHPS-20 internal gripping, lever arm horizontal

Force class 1 (Solid line)  
Force class 2 (Dotted line)  
Force class 3 (Dashed line)  
Force class 4 (Dotted line)

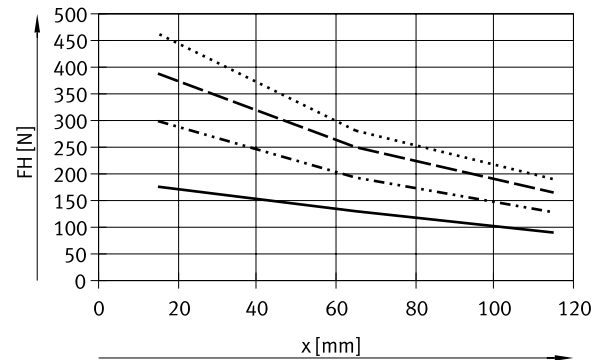


Fig. 17: EHPS-25 external gripping, lever arm vertical

Force class 1 (Solid line)  
Force class 2 (Dotted line)  
Force class 3 (Dashed line)  
Force class 4 (Dotted line)

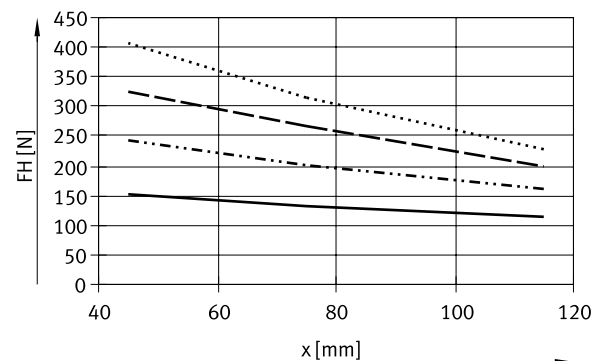


Fig. 18: EHPS-25 internal gripping, lever arm vertical

Force class 1 (Solid line)  
Force class 2 (Dotted line)  
Force class 3 (Dashed line)  
Force class 4 (Dotted line)

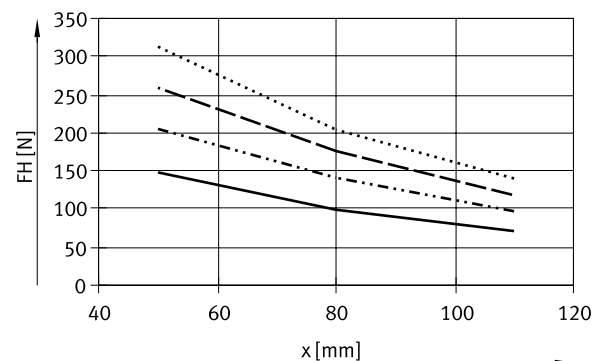


Fig. 19: EHPS-25 external gripping, lever arm horizontal

Force class 1 (Solid line)  
Force class 2 (Dotted line)  
Force class 3 (Dashed line)  
Force class 4 (Dotted line)

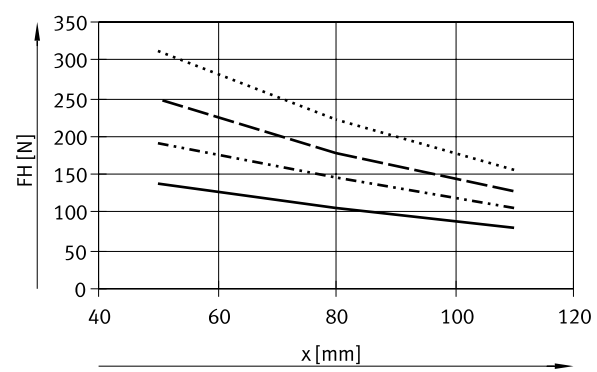


Fig. 20: EHPS-25 internal gripping, lever arm horizontal

|                                                                                  |               |                                                                                   |               |
|----------------------------------------------------------------------------------|---------------|-----------------------------------------------------------------------------------|---------------|
|  | Force class 1 |  | Force class 3 |
|  | Force class 2 |  | Force class 4 |